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The Cephalic Extremity and Movements of the Human Spermatozoon.

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Having had occasion to examine spermatozoa in several medico-legal cases recently, my attention has been called to some interesting features regarding these elementary bodies.

In the following quotations from various reliable authorities there appears to be no statements which agree with my observations as to

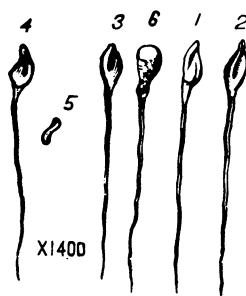
the shape of the head and cause of the movements of the human spermatozoa.

I have been unable to find other authority with satisfactory information regarding this subject.

Dalton in his work on Physiology, (page 696), says: "In many species of animals, the movement of the spermatozoa, strongly resembles that of a tad-pole * * * *. The tail like filaments keep up a constant lateral vibratory motion * * * *. In other instances, as in the Triton, or water lizard, the spermatozoa have a continuous writhing or spiral like movement." No mention is made of this movement in the human spermatozoon or its cause."

Foster's Physiology, page 864, says: The spermatozoa "consist of a flattened ovoidal head, having at its base a tapering caudate appendage in active vibratile motion."

Flint, physiology, page 885, "innumerable bodies, resembling animalcules which present a flattened conoidal head * * * * *



* The caudate appendage is in active motion and the spermatozoids move about the field with considerable rapidity and force," etc.

Stricher's Histology, page 502, under the head of "Motion of the seminal elements," gives no reference to any specific movements of the spermatozoa. The illustrations of the seminal elements are similar to those in the majority of the books.

In Dr. Heitzman's work, Microscopical Morphology of the animal body, page 812. In speaking of the male spermatozoid states that, "the head is of a roundish, ovoid, or conical shape, the point representing the free proximal end * * * * . Spermatozoids when in a fresh condition, are in active, winding or spiral motion, *executed by the tail through which motion the head is rotated with a boring movement*,"* and at the same time the spermatozoid changes place."

Dr. Beale in his work on kidney diseases, urinary deposits, etc., page 329, gives some interesting remarks on the human spermatozoon. He says: "The oval body or head of the particle is hollow, and contains a small quantity of germinal matter * * * *. The shape of the body of the spermatozoa varies according to the quantity of germinal matter present. Those bodies containing little, being flattened toward the apex as compared with those which contain much." The illustrations in his plate X are excellent, but do not give the true representation of the anterior portion of the head. The division between the germinal matter and anterior portion of the head can be easily detected by a good objective.

Letourneau in his work on Biology, page 333, in speaking of the movements, after stating that the "filiform part is the locomotory organ of the spermatozoary," says, "they are sometimes movements of reptation, sometimes movements of torsion, sometimes flutterings, sometimes spirally penetrating movements." No cause for these varied movements, mostly torsion and spiral, is given.

In the *Quarterly Journal of Microscopical Science*, Vol. XIX, p. 487, Heneage Gibbes, M. B., gives an interesting paper on the structure of some of the vertebrate spermatozoa. He does not refer to the human spermatozoon in this article.

An observation of the spermatozoids when in motion will give a good idea of the *twist* in the head, which, from such observation frequently repeated, I am inclined to so term it. In some instances

* Italics Mine.

I have seen this feature more marked than the illustrations show it to be, and consider them not in the least overdrawn. It is best to expose the vessel containing the spermatazoa to the air for eight to ten hours or until their movements are retarded, when the structure of these bodies may be more easily studied. The dead forms show, however, the peculiarities described. The motion of the human spermatazoon is, according to my own observation, produced by the movements of the flagellum which is undoubtedly the propulsive force. The spiral twisting motion is effected principally through the shape of the head. This has a peculiar twist not difficult to distinguish on close observation with high powers, and which I have attempted to represent in sketches 1 2 3 4 and 5, Nos. 1, 2 and 3 are typical, No. 4, frequently observed, No. 5, end view partly schematic and No. 6 a front view, which appears to be the most frequently illustrated of any. The appearances represented by Nos. 1 to 4 were frequently seen as the bodies rolled over. They were examined by a 1-16 inch objective and 1 inch eye-piece and with a homogenous immersion 1-6 of Spencer. It is quite difficult to obtain an anterior *end* view of a spermatazoon, but on two occasions such a view was presented to me, and showed clearly the twisted formation of the head. I will not state that the movements of the flagellum does not, at times produce a twisting, or rolling motion, as on one or two occasions such a motion was observed where the head was prevented from moving forward by an obstruction in its path. When, however, the movement is free in the albuminous fluid a continuous twisting, or rolling motion, is observed which I believe to be produced by the shape of the head in its passage through the menstrum.